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ALPHA CONCEPTS
V.O.C. MITIGATION RADON TESTING & MITIGATION SERVICES

A DIVISION OF RADIATION DATA

Design Specifications for Vapor Extraction Systems for 89 Morris Street Morristown, New Jersey

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September 19, 2006

89 Morris Street Property, Morristown, NJ

1.0 GENERAL INFORMATION

1.1 An investigation authorized by the Comprehensive Environmental Response, Compensation Act, 42 U.S.C. 9601 (CERCLA or the Superfund Law) has determined that the property at 89 Morris Street has been impacted by the intrusion of VOC vapors emanating from ground water and soil contamination related to the former VIP Cleaners. The indoor air contains elevated concentrations of tetrachloroethylene (PCE). There have also been higher concentrations of PCE identified beneath the concrete slabs. These concentrations exceed the acceptable health based concentrations.

EPA has determined that corrective action is required to mitigate the health based threats within the rental spaces. The information in this report fulfills EPA's required scope of work and work plan for the purpose of implementing remedial action.

1.2 The building at 89 Morris Street is a complex structure consisting of joined buildings and multiple additions. The portion of the building that faces Morris Street has housed several Dry Cleaning Operations from 1945 to the present. The back portion and laundry area of the present Dry Cleaner was the original Dry Cleaner building that was built in 1945. The store front that faces Morris Street, which is the clothing pick up and drop off area was added in 1950. In 1952, a single structure consisting of five retail stores was added to the back of the original Dry Cleaner. Approximately thirty feet away from the five retail units is a stand alone store building that was built in 1942. In 1960, walls and a roof were constructed; and a slab poured connecting the five retail unit structure with the stand alone 1942 building. At some point during this time period a ten by eighty-five foot addition was built on the East side of the original Dry Cleaner eliminating the side alley way. In 1998, there was a fifteen foot addition put across the front of the five unit structure and the section that joins the five unit structure to the 1942 building.

Designing an effective Soil Ventilation System requires understanding the relationship between the impacted soil and all of the building segments. Since the present Dry Cleaner will be vacating the leased space sometime between November 1, 2006 and December, 31, 2006 a decision has been made to conduct the diagnostic procedures on this portion of the building after the space has been vacated. On September 6th and 7th sub slab soil classification and permeability mapping was conducted on the remaining three quarters of the building.

2.0 PRINCIPLES OF CONTAMINANT ENTRY

There are three prerequisites for soil borne contaminant entry into a building. They are a nearby source, a driving force that transports contaminants through pathways into buildings, and the entry routes themselves. It is very difficult to stop the movement of contaminants by sealing openings. Soil contaminants predominantly enter a building because of pressure differences between the soil and the area above the slab. It is typically expected that contaminant levels will be higher during the heating season because the rising warm air, which escapes out the top of the building, causes the space directly over the slab to be negative in pressure compared to the soil. In addition, windows and doors are less likely to be left open during the heating season.

2.1 Temperature Driven Transport

When it is colder outside than inside, the warmer inside air is lighter; it rises and escapes the building through openings around upper windows and roof flanges. Similar to a hot air balloon, the large volume of air that is forcing its way upward is pulling on the floor below just like the balloon pulls on the basket. This force makes the building behave like a chimney. Temperature driven airflow is often referred to as stack effect. The resulting suction is applied to the floor by the rising warm air draws soil gases from beneath the building through pathways and into the occupied space.

2.2 Wind Driven Transport

Soil pollutants enters buildings when wind induced negative pressures are transferred into the structure resulting in the uptake of soil gas. Wind creates a complex pressure field around a building. It can create a positive pressure on the windward side and a negative pressure on the leeward side. When wind driven air travels over and around a building it has to travel a greater distance then the air that is blowing past the building in a parking lot or field. Similar to when air passes over an airplane wing, the air has to travel a longer distance around the top of the wing than the bottom. The resulting negative pressure or vacuum on the top side of the wing pulls the entire weight of the airplane up. Since the geometry of a strip mall building is not similar to an airplane wing, rarely is the roof pulled of a building, the vacuum created on the top and leeward side of the structure is strong enough to draw soil borne pollutants into the building.

2.3 Mechanically Driven Transport

Air moves through soils from areas of higher to lower air pressure. When air is mechanically drawn out of a building, air pressure differentials are created between inside and outside the building. The resulting negative pressure pulls air into the building to replace the air that has left. When the building is depressurized this way, air from the soil beneath the slab enters the building through cracks and other pathways and creates suction on the surrounding soil. Sometimes, contaminants enter the building because exhaust fans, such as the ones used in the Dry Cleaning operation, induce a negative pressure that pulls contaminants into the building. In other cases the HVAC creates a negative pressure where there are openings to the soil and it draws contaminants directly into the building. All of these entry mechanisms need to be considered when designing an Active Soil Depressurization system.

3.0 MITIGATION APPROACHES

3.1 The primary method for reducing soil borne pollutants is Active Soil Depressurization (ASD). ASD systems prevent soil borne pollutants entry into a building by creating a negative pressure beneath the slab. An ASD system will draw pollutants from beneath the slab, through PVC piping to the exterior of the building where it is vented above the roofline and quickly diluted with ambient air. The ASD system also removes moisture and other soil bourn pollutants that can enter the building and,

therefore, improves the overall indoor air quality of the building.

4.0 CONSTRUCTION FEATURES

As referenced in Section 1.2, the building is made up of a series of additions and joined structures. The overall construction is slab on grade with stem walls. The underlying fill material beneath each of the building segments is native clay soil with the exception of where there is crushed stone beneath the 1998 addition. The roof construction is a flat roof with torch down rubbing roofing material. Each segmented unit has its own roof mounted air handling unit.

5.0 DIAGNOSTIC FINDINGS

5.1 Sub-Slab Pressure Field Tests

In order to determine the requirements of depressurizing the soil, sub-slab soil permeability test were conducted on September 6th and 7th, 2006. These tests required drilling holes through the concrete slabs at locations that would be practical to install a future contaminant depressurization pipe. A shop vacuum and two different centrifugal blowers were used to draw air from the suction holes. Smaller test holes were drilled through the slab at varying distances from the suction hole. Static vacuum and air flow measurements were conducted at each suction hole location. A micro manometer was used to measure pressure differentials at the EPA sampling ports and test holes. With the exception of the 1998 addition which is crushed stone the sub slab fill material is native loamy clay. Depressurizing denser soils will require low airflow high vacuum blowers while the area with crushed stone will require lower vacuum higher airflow blowers. The Vacuum field and air flow measurements are listed on the table below and grouped by numbered area with the suction holes and test ports referenced on the building diagram.

89 Morris Street Vacuum Field Measurements

Test Area # 1

Suction Hole S-1

Vacuum at Suction Point Measured in Inches of W.C.		*Actual Vacuum Measured in Inches of W.C.*	*Air Flow Measured in Cubic Feet Per Minute*	*Sample Floor Point*	*Distance from Suction Point*	*Vacuum at Suction Point in Inches of W.C.*
SHOP VAC	47	34	68.58	F-1(EPA)	19' 7"	0.0225
EAGLE	4.2	4.5	n/a	F-2 (EPA)	52'	2.5000
SHOP VAC	47	34	68.58	F-3	21'	0.0775
EAGLE	4.2	4.5	n/a	F-3	21'	0.0145
SHOP VAC	47	34	68.58	F-4	40'	0.0223
EAGLE	4.2	4.5	n/a	F-4	40'	0.0170
SHOP VAC	47	34	68.58	F-5	52'	0.0033
SHOP VAC	47	34	68.58	F-23	40'	0.2170

SHOP VAC	47	34	68.58	F-26 (EPA)	1' 0"	6.0000
SHOP VAC	47	34	68.58	F-28	54' 2"	0.1650

Suction Hole S-2

SHOP VAC	47	47	68.58	F-5	17' 8"	0.0066
SHOP VAC	47	47	58.58	F-27	15' 10"	0.0284

Test Area # 2

Suction Hole S-6

Vacuum at Suction Point Measured in Inches of W.C.		*Actual Vacuum Measured in Inches of W.C.*	*Air Flow Measured in Cubic Feet Per Minute*	*Sample Floor Point*	*Distance from Suction Point*	*Vacuum at Suction Point in Inches of W.C.*
SHOP VAC	47	36	44.8	F-20 (EPA)	1.0"	14.0000
EAGLE	4.2	4	7.79	F-20 (EPA)	1.0"	1.6700
SHOP VAC	47	36	44.8	F-21	10'4"	0.0144
EAGLE	4.2	4	7.79	F-21	10'4"	0.0011
SHOP VAC	47	36	44.8	F-22	19'8"	0.0002

Test Area # 7

Suction Hole S-3

Vacuum at Suction Point Measured in Inches of W.C.		*Actual Vacuum Measured in Inches of W.C.*	*Air Flow Measured in Cubic Feet Per Minute*	*Sample Floor Point*	*Distance from Suction Point*	*Vacuum at Suction Point in Inches of W.C.*
SHOP VAC	47	29	not measured	F-6 (EPA)	9' 6"	0.2400
EAGLE	4.2	4	5.5	F-6 (EPA)	9' 6"	0.0310
SHOP VAC	47	29	not measured	F-7	21' 0"	0.1238
EAGLE	4.2	4	5.5	F-7	21' 0"	0.0142
SHOP VAC	47	29	n/a	F-8	44' 4"	0.0055
EAGLE	4.2	4	5.5	F-8	44' 4"	0.0080
SHOP VAC	47	29	not measured	F-9	24' 0"	0.0975
EAGLE	4.2	4	5.5	F-9	24' 0"	0.0177

Suction Hole S-7

SHOP VAC	47	12	128	F-7	20'10"	0.4100
EAGLE	4.2	3.2	31	F-7	20'10"	0.0550
SHOP VAC	47	12	128	S-3	5'4"	0.6700
SHOP VAC	47	12	128	F-8	49'0"	0.0050
EAGLE	4.2	3.2	31	F-8	49'0"	0.0015
SHOP VAC	47	12	128	F-24	40'8"	0.1200
EAGLE	4.2	3.2	31	F-24	40'8"	0.0200
SHOP VAC	47	12	128	F-25 (EPA)	48'0"	0.0000

Suction Hole S-9

SHOP VAC	47	45	13.2	F-8	8'8"	0.1800
SHOP VAC	47	45	13.2	F-6 (EPA)	45'3"	0.0000
SHOP VAC	47	45	13.2	S-3	42'4"	0.0000
SHOP VAC	47	45	13.2	F-25 (EPA)	29"4"	0.0080

Test Area # 8

Suction Hole S-5

Vacuum at Suction Point Measured in Inches of W.C.		*Actual Vacuum Measured in Inches of W.C.*	*Air Flow Measured in Cubic Feet Per Minute*	*Sample Floor Point*	*Distance from Suction Point*	*Vacuum at Suction Point in Inches of W.C.*
SHOP VAC	47	13	127.1	F-13	16' 0"	0.0255
EAGLE	4.2	3.3	24.6	F-13	16' 0"	0.0030
LEGEND	2.6	2.2	45.25	F-13	16' 0"	0.0070
SHOP VAC	47	13	127.1	F-15	23' 6"	0.0075
EAGLE	4.2	3.3	24.6	F-15	23' 6"	0.0020
LEGEND	2.6	2.2	45.25	F-15	23' 6"	0.0080
SHOP VAC	47	13	127.1	F-16	19' 8"	0.0055
EAGLE	4.2	3.3	24.6	F-16	19' 8"	0.0020
LEGEND	2.6	2.2	45.25	F-16	19' 8"	0.0024
SHOP VAC	47	13	127.1	F-17 (EPA)	5' 0"	0.4000
SHOP VAC	47	13	127.1	F-18	1' 0"	3.1800
EAGLE	4.2	3.3	24.6	F-18	1' 0"	0.37
LEGEND	2.6	2.2	45.25	F-18	1' 0"	0.75

Test Area # 9

Suction Hole S-4

Vacuum at Suction Point Measured in Inches of W.C.		*Actual Vacuum Measured in Inches of W.C.*	*Air Flow Measured in Cubic Feet Per Minute*	*Sample Floor Point*	*Distance from Suction Point*	*Vacuum at Suction Point in Inches of W.C.*
SHOP VAC	47	42	33.7	F-10	16' 6"	0.0062
EAGLE	4.2	4	5.5	F-10	16' 6"	not measured
LEGEND	2.6	2	4.26	F-10	16' 6"	0.0017
SHOP VAC	47	42	33.7	F-11	24' 8"	0.0012
LEGEND	2.6	2.3	4.26	F-11	24' 8"	0.0012
SHOP VAC	47	42	33.7	F-12	22' 8"	0.0029
EAGLE	4.2	4	5.5	F-12	22' 8"	0.0010
LEGEND	2.6	2	5.5	F-12	22' 8"	0.0002
LEGEND	2.6	2.3	4.26	F-13	18' 6"	0.0015
SHOP VAC	47	42	33.7	F-19	1' 0"	0.6350
SHOP VAC	47	42	33.7	F-14 (EPA)	9' 3"	0.0473
LEGEND	2.6	2	4.26	F-14 (EPA)	9' 3"	0.0030

6.0 GENERAL SYSTEM DESIGN INFORMATION

Throughout these specifications the Owner or their representative shall be referred to as the "Owner". The selected mitigation contractor shall be referred to as the "Contractor".

7.0 GENERAL INSTALLATION REQUIREMENTS

All portions of the contaminant system will abide by the relevant specifications specified in Section 7.0 to, and including, Section 15.1.

7.1 The contaminant mitigation system installation shall be done so as to coordinate with other building components especially those that require maintenance or clearance of any type. All mitigation system components shall be installed to facilitate servicing, maintenance and repair or replacement of other equipment components in or outside the building. Where mounting heights are not detailed or dimensions given, system materials and equipment are to be installed to provide the maximum headroom or side clearance as is possible. The Owner must be contacted in cases where a conflict exists between these or other requirements and the drawings or specifications. All systems, materials and equipment shall be installed level, plumb, parallel or perpendicular to other building systems and components unless otherwise specified.

7.2 The Contractor shall take every possible precaution to avoid any damage to existing utilities located anywhere in the building or those located in or below the slab floor. It is our understanding that the blueprints indicating utility piping in or under the slab are not available. Undocumented sub-slab utilities may alter the scope of work. A metal detecting relay box or another similar instrument will be used in conjunction with any slab drilling.

7.3 The Owner will be responsible for covering or finishing any contaminant piping or electrical conduit that the owner desires to conceal. The Contractor shall seal all penetrations through foundation walls or floors. There shall be no placement of piping or conduit that would inhibit intended use of any areas.

7.4 The Contractor shall ensure that any foreign materials are not left or drawn into the contaminant system piping or fan which might at a later period interfere with or in any way impair the contaminant system performance.

7.5 The entire system shall have UL or equivalent ratings for both individual components and the entire system as applicable.

8.0 SYSTEM MATERIALS

Contaminant Vent Piping

PVC schedule 40 pipe and fittings (ASTM D-2665)
(Foam core PVC piping can be used)
PVC cement primer shall comply with ASTM F-656
PVC cement adhesive shall comply with ASTM D-2564

Piping Supports

3" and 4" Hanging Pipe Supports
Swivel ring or standard bolt type clevis
Adjustable band hanger
Sammy Screws or Drop in Anchors
3/8" threaded rod
Assorted bolts, nuts & washers
3" and 4" Pipe Secured to Concrete Floor or Wall
Slotted Conduit Channel
Conduit Clamps
3/8" Wedge Anchors
Assorted bolts, nuts & washers

Contaminant Fan

AMG Force Blower
Fantech HP 220
4" to 6" rubber boots with stainless steel hose clamps
4" to 4" rubber boots with stainless steel hose clamps

Sealing Materials

Urethane sealant shall comply with Federal Specification TT-S-00230C, Subject to compliance with Contract requirements; the following manufacturers of urethane caulking sealants may be used:

Pecora Corp. (Dynatrol)
Mameco Inc. (Vulkem or CR Lawrence)

Visual pressure indicator

U-tube manometer

9.0 SUCTION HOLE INSTALLATION

9.1 In order to achieve the vacuum field distribution and not disrupt building use objectives, each of the six suction points will be located in near exterior or partition walls. The specific location of each suction hole will be agreed upon by the contractor and owner prior to initiating remediation. Each suction hole will be cut approximately 5" in diameter. The Contractor will follow the procedures listed in Section 7.2 to minimize damaging any sub-slab utilities.

9.2 The Contractor shall remove a minimum of one cubic foot of sub-slab material from each suction hole. Primary suction points will consist of PVC schedule 40 pipe shall be installed so that it is flush with the bottom of the concrete slab in each suction hole. The pipe shall be secured above the suction hole with a pipe clamp attached to the concrete ceiling, cement wall or concrete floor. The pipe will be sealed into each suction hole by inserting backer rod material of sufficient size to compress between the pipe and the concrete floor. Urethane gun-grade caulking or mortar mix will be installed on top of the backer rod.

9.3 There are a total of 13 suction points to be installed. (See Suction Point Location on the Building Diagram)

9.4 Disposing of soil excavated from the suction points is the responsibility of the owner.

10.0 PVC PIPE INSTALLATION

10.1 All horizontal pipe runs between the fan and the first suction hole shall be installed with 1 inch slope back to a suction hole for each ten feet of horizontal pipe run. All vertical pipe runs shall be installed plumb. All horizontal runs after the first suction hole may be run level. In no case however shall the piping be installed so as to create a possible water trap in the piping.

10.2 The pipe will be supported at least every eight feet of horizontal run and at least every ten feet of vertical run. All horizontal pipe runs will have a support with an appropriate device within two feet of each fitting and a maximum distance between supports of eight feet as per BOCA National Plumbing Code. The ceiling supporting devices shall be a 3/8 inch all thread rod to structural members capable of providing the necessary support. Conduit channel with pipe clamps can also be used to support PVC routed along the ceiling or walls. PVC pipe cannot be supported by other building piping or ducts. Swivel ring or standard bolt type clevis shall be used to support PVC pipe.

10.3 All support straps and anchors installed outdoors shall be either aluminum, stainless steel or galvanized.

11.0 BLOWER INSTALLATION

11.1 There will be total of eight roof mounted blowers. Six AMG Force high suction blowers and two Fantech HP 220 blowers. The AMG Force blowers will be mounted on galvanized stands with high density foam rubber blocks separating the metal stands from the roofing material. Fantech HP 220 blowers will be attached to the riser pipe with rubber boots in a manner that allows easy removal for replacement or maintenance. (See contaminant Blower-Detail Section, pg. 12-17)

11.2 The location of the blowers is noted on the print. The AMG Force blowers are symbolized by an orange square with a dot in the center and the Fantech HP 220 Blowers are symbolized by an orange circle with a dot in the center. Blower exhaust shall be at least 20 from air intakes, passive relief vents and 10 feet from lot lines.

11.0 ROOF PENETRATIONS

11.1 All roof penetrations must be coordinated with the Owner prior to performing the work. The Contractor will make the penetration through the roof. The Owners roofing shall perform the flashing related sealing work.

11.2 The building owner is responsible for sub-contracting the roofing contractor to install the sealing for pipe and conduit roof penetrations.

12.0 SEALING

12.1 Slab Crack and Expansion Joint Sealing

Any visible expansion joints or slab cracks in the areas being mitigated that have 1/16 inch or greater opening shall be sealed. Any cracks to be sealed will first be ground out and vacuumed to prepare them for installation of gun-grade urethane caulk sealant. Cracks or open expansion joints in the concrete floor shall be sealed by applying a bead of urethane caulk on top of the joint. The gun-grade caulk shall then be mechanically pressed down into the crack in order to maximize its seal. Sealants that spill over onto the floor shall be scraped off as soon as possible and then wiped thoroughly with a solvent and a rag. Any openings into the slab such as may occur around conduit pipe penetrations through the slab will be cleaned and sealed with gun-grade urethane caulk.

12.2 Perimeter Expansion Joint

Any expansion strips in the concrete slab of the rooms being mitigated that are accessible shall be sealed with urethane caulking. The perimeter floor joint will be sealed with gun-grade urethane caulking after the joint has been vacuumed.

12.3 Exposed Soil around Conduit the Opening

There is an area of exposed soil in the North utility closet in area one that contains a below grade electrical conduit. Excess soil should be removed and a skim coat of mortar applied over the soil leaving the conduit accessible.

13.0 FAN WIRING AND PRESSURE GAUGE

13.1 The owner is responsible for providing electrical panel capacity. A dedicated breaker is not required.

13.2 The owner will install, within two feet of each blower a roof mounted disconnect switch in an outdoor rated electrical box with an outdoor rated switch cover.

13.3 The Contractor is responsible for providing conduit, wiring and electrical power from the switch to the blower. The Contractor shall use outdoor rated flexible conduit from each switch box to the blower. Wiring from the switch box to the blower shall be approved individual 12 gauge wire.

13.4 The specified AMG Force blower has a maximum amperage draw of less than 2.48 amps and a voltage requirement of 120 volts. The Fantech Blower has a maximum amperage draw of less than 2 amps and a voltage requirement of 110 volts.

13.5 A U-tube manometer will be installed for each fan by the Contractor on a vertical section of the piping inside the building. The location of the U-tube will be decided in consultation with the Owner.

14.0 SYSTEM LABELING

14.1 A label will be installed at the disconnect switch next to the fan that says "Active Soil Depressurization System, Do not alter." The breaker number powering the fan shall be indicated on the same disconnect switch. The electrical circuit at the main panel that is used to control the fan shall be labeled as "Active Soil Depressurization System."

14.2 All U-tube manometer locations shall contain a label explaining their use and be marked with the installation date and final installation U-tube pressure readings. At least every 20 feet of contaminant vent pipe length shall have a label that reads "Active Soil Depressurization System" attached to the pipe. All labels must be readable from 3 feet away.

14.3 The Contractors name, telephone number, date of installation, and NJDEP Certification number shall be left at the main panel that powers each contaminant system.

15.0 FINAL VACUUM TEST

15.1 The Contractor shall measure the pressure field extension beneath the sub-slab created by each ASD system. Micro-manometer measurements should be made at each of the original test holes. The Contractor shall record these final pressure readings between the sub-slab and the room in a format similar to the one in section 5.1. The pressure measurements will be made with a digital micro-manometer capable of reading down to 0.001". A copy of these final measurements, including the U-tube measurements, will be maintained by the Contractor and the Owner.

16.0 PERMITS

16.1 It is the responsibility of the remediation contractor to secure the municipal permits. The owner's electrician will fill out and seal the electrical permit and provide it to the remediation contractor.

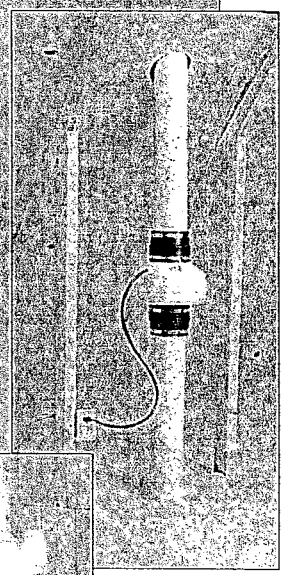
16.2 The owner shall arrange and provide building access for the municipal building inspectors to inspect the relevant components of the ASD system.

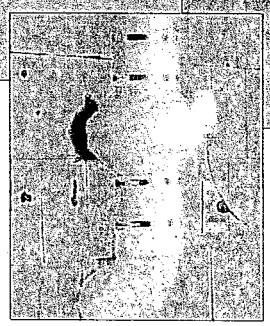
16.3 Any additional system components or permits that are not addressed in this scope of work but subsequently required by a municipal, state or federal agency shall constitute a change in scope of work and be addressed as a separate line item cost to the owner.

Fantech

Trust the Industry Standard!

Improved UV resistance!

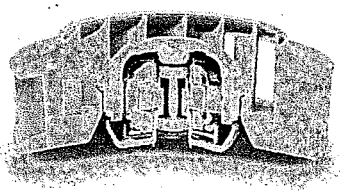




HP Series Fans for Radon Applications

Why put your reputation at stake by installing a fan you know won't perform like a Fantech? For nearly twenty years, Fantech has manufactured quality ventilation equipment for Radon applications. Fantech is the fan Radon contractors have turned to in over 1,000,000 successful Radon installations worldwide.

Fantech HP Series Fans Provide the Solutions to meet the challenges of Radon applications:



HOUSING
- UV resistant, UL listed durable plastic
- UL Listed for use in commercial applications
- Factory sealed to prevent leakage
- Watertight electrical terminal box
- Approved for mounting in wet locations - i.e. Outdoors

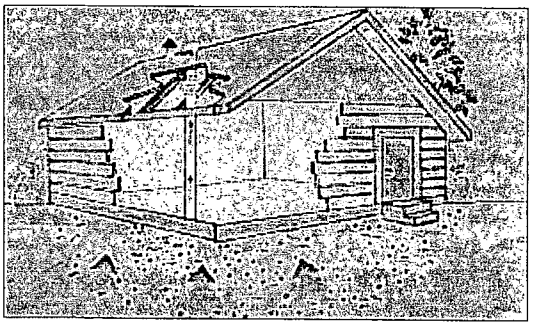
MOTOR
- Totally enclosed for protection
- High efficiency EBM motorized impeller
- Automatic reset thermal overload protection
- Average life expectancy of 7-10 years under continuous load conditions

RELIABILITY
- Five Year Full Factory Warranty
- Over 1,000,000 successful radon installations worldwide

HP Series Fans are specially designed with higher pressure capabilities for Radon Mitigation applications

Fantech

Fantech has developed the HP Series fans specifically to suit the higher pressure capability requirements needed in Radon Mitigation applications. Most Radon Mitigators who previously used the Fantech FR Series fans have switched to the new HP Series.



Performance Data

Fan Model	Volts	Wattage Range	Max. Amps	CFM vs. Static Pressure in Inches W.G.								Max. Ps
				0"	0.5"	0.75"	1.0"	1.25"	1.5"	1.75"	2.0"	
HP2133	115	14 - 20	0.17	134	68	19	-	-	-	-	-	0.84
HP2190	115	60 - 85	0.78	163	126	104	81	58	35	15	-	1.93
HP175	115	44 - 65	0.57	151	112	91	70	40	12	-	-	1.66
HP190	115	60 - 85	0.78	157	123	106	89	67	45	18	1	2.01
HP220	115	85 - 152	1.30	344	260	226	193	166	137	102	58	2.46

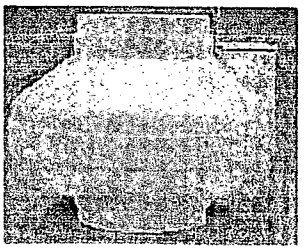
HVI MEMBER™

Performance Curves

Fantech provides you with independently tested performance specifications.

The performance curves shown in this brochure are representative of the actual test results recorded at Texas Engineering Experiment Station/Energy Systems Lab, a recognized testing authority for HVI. Testing was done in accordance with AMCA Standard 210-85 and HVI 915 Test Procedures. Performance graphs show air flow vs. static pressure.

Use of HP Series fans in low resistance applications such as bathroom venting will result in elevated sound levels. We suggest FR Series or other Fantech fans for such applications.

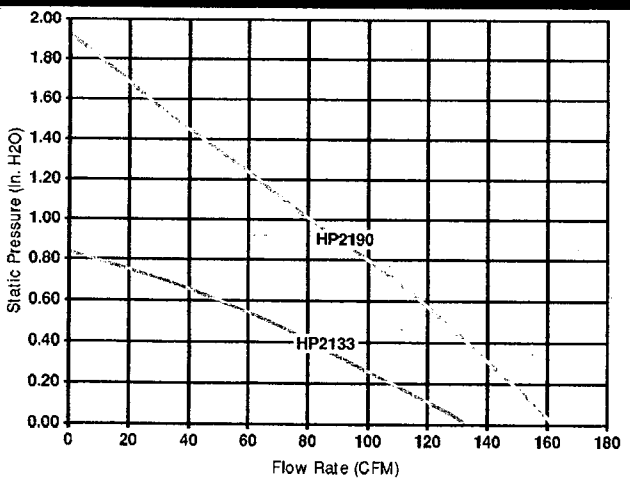


HP FEATURES INCLUDE

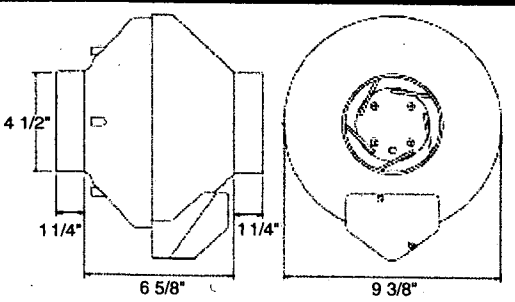
- Improved UV resistant housings approved for commercial applications.
- UL Approved for Wet Locations (Outdoors)
- Sealed housings and wiring boxes to prevent Radon leakage or water penetration
- Energy efficient permanent split capacitor motors
- External wiring box
- Full Three Year Factory Warranty

c UL us

HP2133 and 2190 Radon Mitigation Fans



Tested with 4" ID duct and standard couplings.

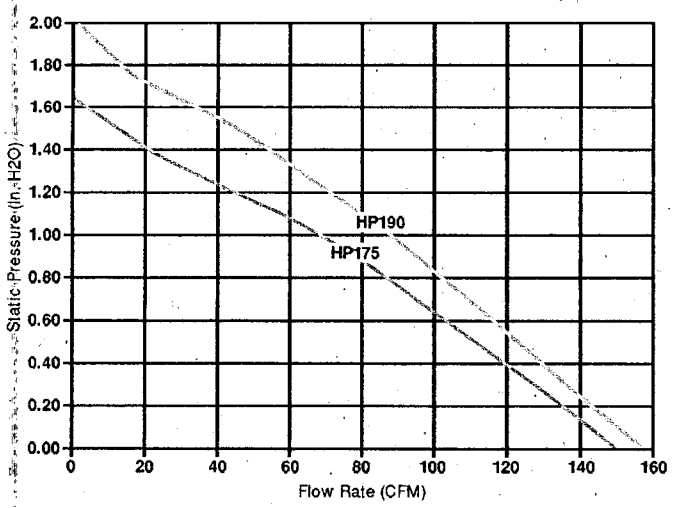


HP2133 – For applications where lower pressure and flow are needed. Record low power consumption of 14-20 watts! Often used where there is good sub slab communication and lower Radon levels.

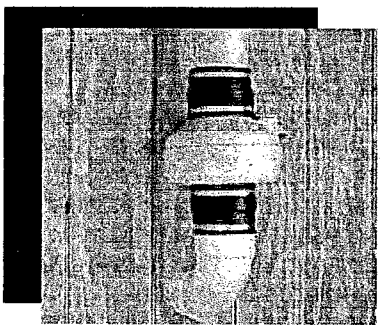
HP2190 – Performance like the HP190 but in a smaller housing. Performance suitable for the majority of installations.

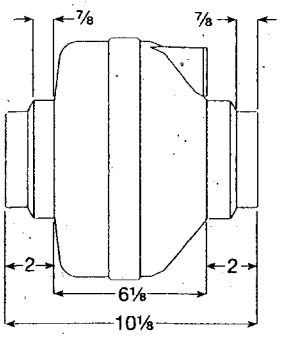
Fans are attached to PVC pipe using flexible couplings.
For 4" PVC pipe use Indiana Seals #156-44, Pipeconx PCX 56-44 or equivalent.
For 3" PVC pipe use Indiana Seals #156-43, Pipeconx PCX 56-43 or equivalent.

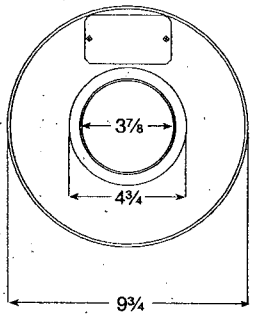
HP175 and HP190 Radon Mitigation Fans



Tested with 4" ID duct and standard couplings.







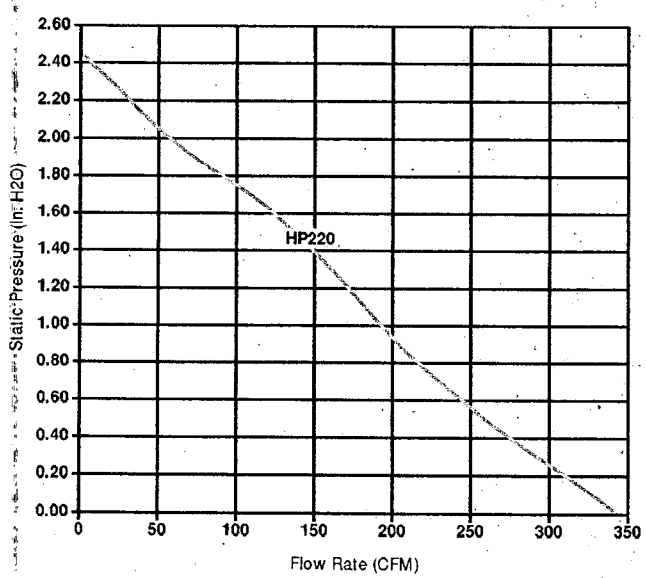
HP175 – The economical choice where slightly less air flow is needed. Often used where there is good sub slab communication and lower Radon levels.

HP190 – The standard for Radon Mitigation. Ideally tailored performance curve for a vast majority of your mitigations.

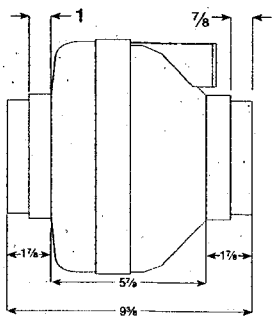
Fans are attached to PVC pipe using flexible couplings.
For 4" PVC pipe use Indiana Seals #151-44, Pipeconx PCX 51-44 or equivalent.

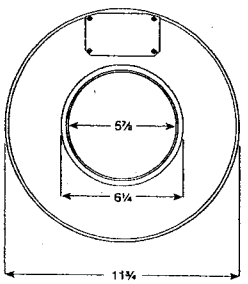
For 3" PVC pipe use Indiana Seals #156-43, Pipeconx PCX 56-43 or equivalent.

HP220 Radon Mitigation Fan



Tested with 6" ID duct and standard couplings.



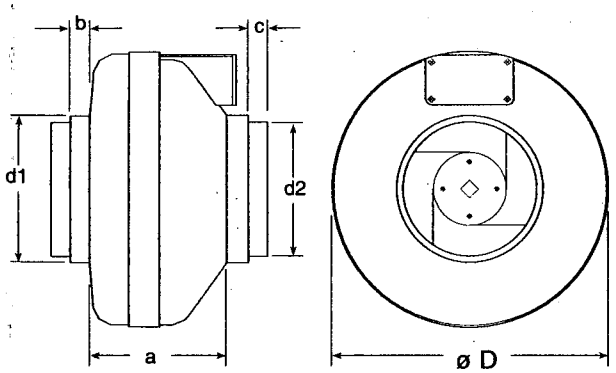


HP 220 – Excellent choice for systems with elevated radon levels, poor communication, multiple suction points and large subslab footprint. Replaces FR 175.

Fans are attached to PVC pipe using flexible couplings.
For 4" PVC pipe use Indiana Seals #156-64, Pipeconx PCX 56-64 or equivalent.

For 3" PVC pipe use Indiana Seals #156-63, Pipeconx PCX 56-63 or equivalent.

The Original Mitigator – Fantech's FR Series Fans



Dimensional Data

model	øD	d1	d2	a	b	c
FR100	9 1/2	3 7/8	4 7/8	6 1/8	7/8	7/8
FR110	9 1/2	3 7/8	4 7/8	6 1/8	7/8	7/8
FR125	9 1/2	–	4 7/8	6 1/8	7/8	–
FR140	11 3/4	5 7/8	6 1/4	5 7/8	1	7/8
FR150	11 3/4	5 7/8	6 1/4	5 7/8	1	7/8
FR160	11 3/4	5 7/8	6 1/4	6 3/8	1	7/8
FR200	13 1/4	7 7/8	9 7/8	6 1/4	1 1/2	1 1/2
FR225	13 1/4	7 7/8	9 7/8	6 1/4	1 1/2	1 1/2
FR250	13 1/4	–	9 7/8	6 1/4	–	1 1/2

All dimensions in inches

Performance Data

Fan Model	Energy Star	RPM	Volts	Rated Watts	Wattage Range	Max. Amps	CFM vs. Static Pressure in Inches W.G.							Max. Ps	Duct Dia.
							0"	.2"	.4"	.6"	.8"	1.0"	1.5"		
FR100	✓	2900	115	19	13 - 19	0.18	122	100	78	55	15	-	-	0.87"	4"
FR110	-	2900	115	80	62 - 80	0.72	167	150	133	113	88	63	41	0.60"	4"
FR125	✓	2950	115	18	15 - 18	0.18	148	120	88	47	-	-	-	0.79"	5"
FR140	✓	2850	115	61	47 - 62	0.53	214	190	162	132	99	46	-	0.15"	6"
FR150	✓	2750	120	71	54 - 72	0.67	263	230	198	167	136	106	17	1.58"	6"
FR160	-	2750	115	129	103 - 130	1.14	289	260	233	206	179	154	89	2.32"	6"
FR200	✓	2750	115	122	106 - 128	1.11	408	360	308	259	213	173	72	2.14"	8"
FR225	✓	3100	115	137	111 - 152	1.35	429	400	366	332	297	260	168	2.48"	8"
FR250*	-	2850	115	241	146 - 248	2.40	649	600	553	506	454	403	294	2.58"	10"

FR Series performance is shown with ducted outlet. Per HVI's Certified Ratings Program, charted air flow performance has been derated by a factor based on actual test results and the certified rate at .2 inches WG.
* Also available with 8" duct connection. Model FR 250-8. Special Order.

Five (5) Year Warranty

This warranty supersedes all prior warranties

DURING ENTIRE WARRANTY PERIOD:

FANTECH will replace any fan which has a factory defect in workmanship or material. Product may need to be returned to the Fantech factory, together with a copy of the bill of sale and identified with RMA number.

FOR FACTORY RETURN YOU MUST:

- Have a Return Materials Authorization (RMA) number. This may be obtained by calling FANTECH either in the USA at 1.800.747.1762 or in CANADA at 1.800.565.3548. Please have bill of sale available.
- The RMA number must be clearly written on the outside of the carton, or the carton will be refused.
- All parts and/or product will be repaired/replaced and shipped back to buyer; no credit will be issued.

OR

The Distributor may place an order for the warranty fan and is invoiced. The Distributor will receive a credit equal to the invoice only after product is returned prepaid and verified to be defective.

FANTECH WARRANTY TERMS DO NOT PROVIDE FOR REPLACEMENT WITHOUT CHARGE PRIOR TO INSPECTION FOR A DEFECT. REPLACEMENTS ISSUED IN ADVANCE OF DEFECT INSPECTION ARE INVOICED, AND CREDIT IS PENDING INSPECTION OF RETURNED MATERIAL. DEFECTIVE MATERIAL RETURNED BY END USERS SHOULD NOT BE REPLACED BY THE DISTRIBUTOR WITHOUT CHARGE TO THE END USER, AS CREDIT TO DISTRIBUTOR'S ACCOUNT WILL BE PENDING INSPECTION AND VERIFICATION OF ACTUAL DEFECT BY FANTECH.

THE FOLLOWING WARRANTIES DO NOT APPLY:

- Damages from shipping, either concealed or visible. Claim must be filed with freight company.
- Damages resulting from improper wiring or installation.
- Damages or failure caused by acts of God, or resulting from improper consumer procedures, such as:

1. Improper maintenance
2. Misuse, abuse, abnormal use, or accident, and
3. Incorrect electrical voltage or current.

- Removal or any alteration made on the FANTECH label control number or date of manufacture.
- Any other warranty, expressed, implied or written, and to any consequential or incidental damages, loss or property, revenues, or profit, or costs of removal, installation or reinstallation, for any breach of warranty.

WARRANTY VALIDATION

- The user must keep a copy of the bill of sale to verify purchase date.
- These warranties give you specific legal rights, and are subject to an applicable consumer protection legislation. You may have additional rights which vary from state to state.

For more information contact:

Fantech

web: www.fantech.net
e-mail: info@fantech.net

United States
1712 Northgate Blvd.
Sarasota, Florida 34234
Phone: 800-747-1762; 941-309-6000
Fax: 800-487-9915; 941-309-6099

Canada
50 Kanalflakt Way
Bouctouche, NB E4S 3M5
Phone: 800-565-3548; 506-743-9500
Fax: 877-747-8116; 506-743-9600

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Form#HP1005

The Force... behold the power

Performance Figures - AMG Force, Radon Extract Fan

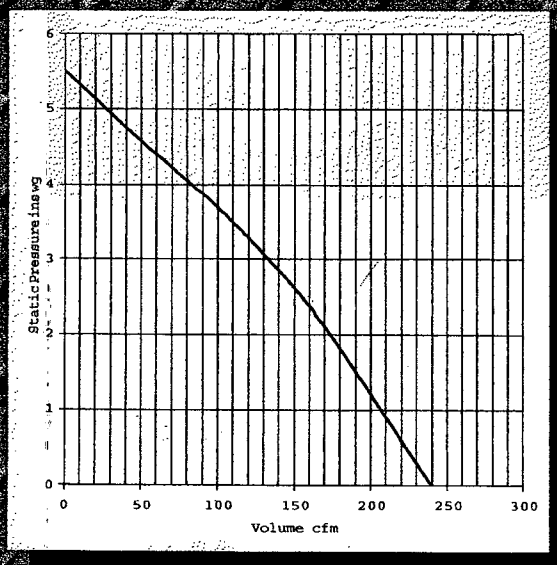
				CFM at STATIC PRESSURE in. w.g.										
Model #	Volts	Watts	Max. Amps	0"	0.5"	1.0"	1.5"	2.0"	2.5"	3.0"	3.5"	4.0"	4.5"	5"	5.512"
AMG Force	120V 60Hz	302	2.48	240	225	207	191	174	155	133	110	83	55	28	0

Weight: 19lb. Fan Speed: 2950 rpm

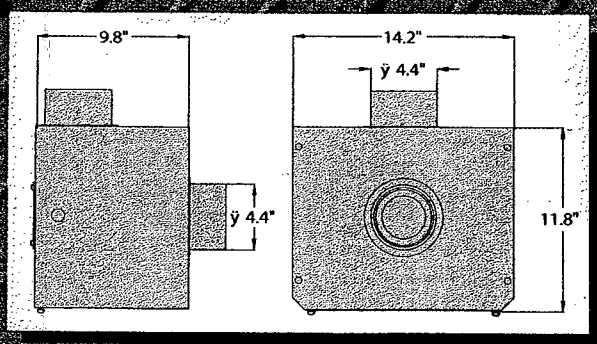
Performance shown is for installation type D - Ducted inlet, Ducted outlet.
Speed (rpm) shown is nominal. Performance is based on actual speed of test.

Performance ratings do not include the effects of appurtenances in the airstream.
The performance figures shown have been corrected to standard air density.

Performance Graph



Dimensions



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Festa Radon Technologies Co

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Fax 1(412) 931-0754

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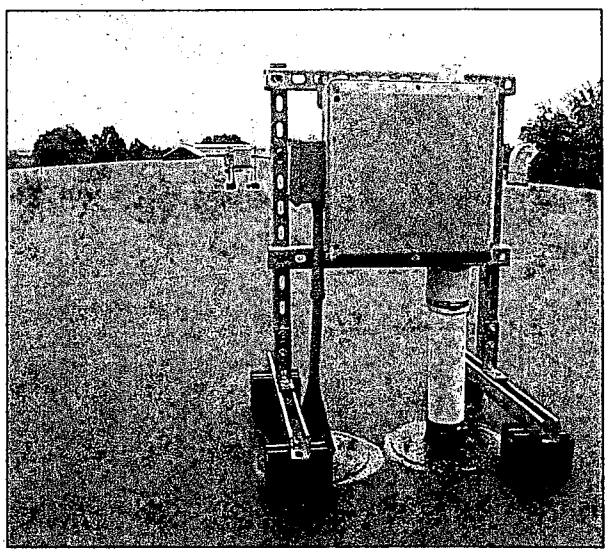
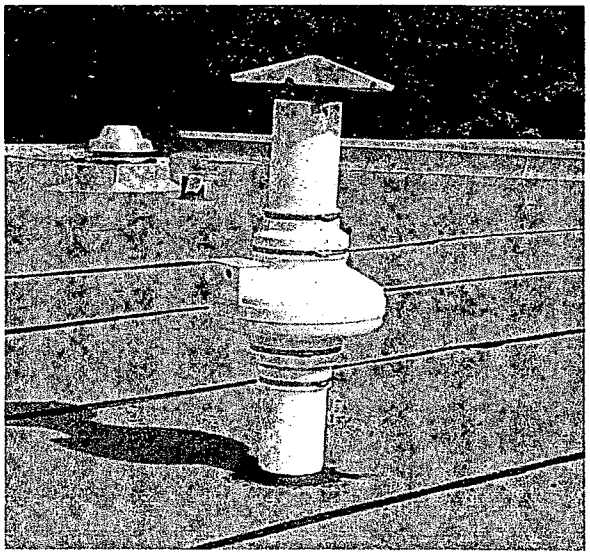
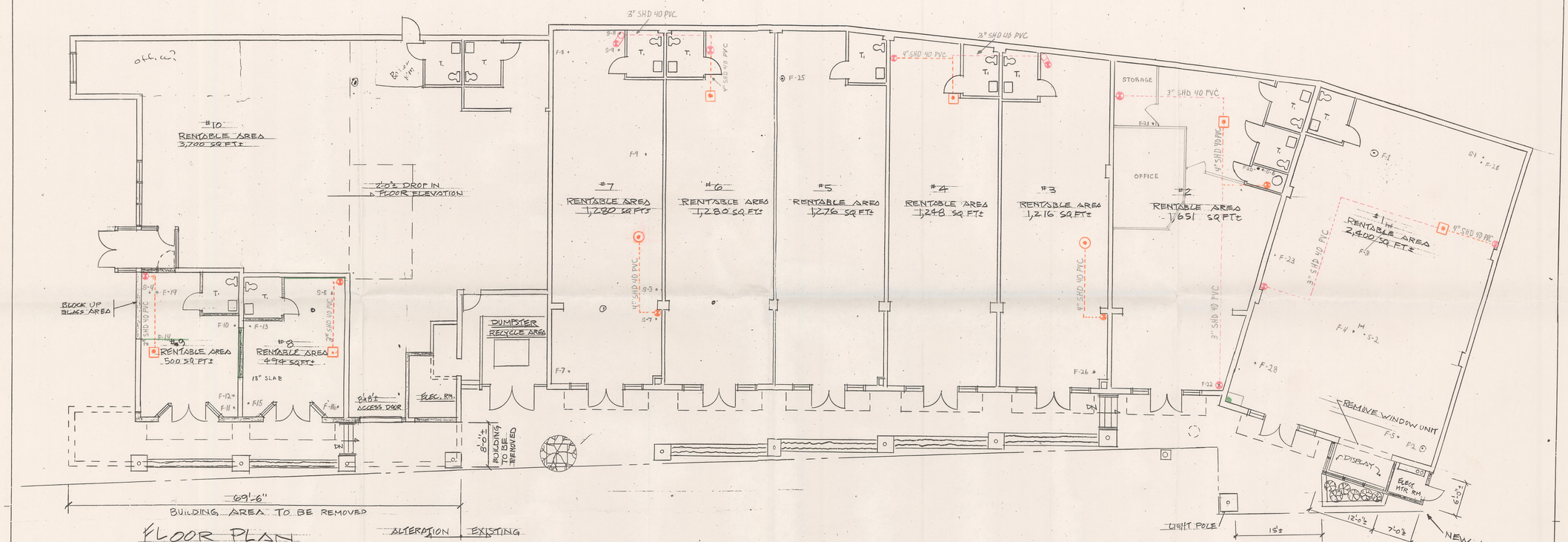


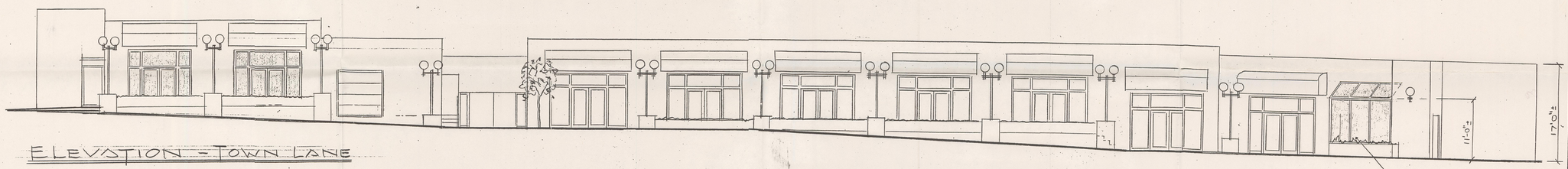
Example of Roof Mounted Blower with Stands



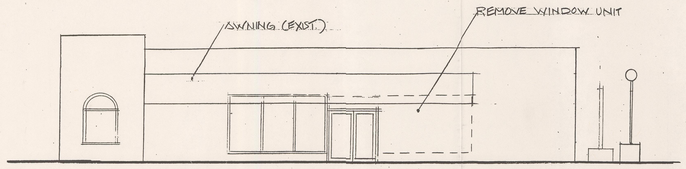
Example of Roof Mounted Fantech Blower



FLOOR PLAN



ELEVATION - TOWN LANE



ELEVATION - MORRIS STREET

ALL FINISHES OF ALTERATION AND ADDITION TO MATCH EXISTING (PREVIOUSLY APPROVED) ADJACENT BUILDING - SIDING, LIGHTS, CANVAS AWNINGS, PLANTERS, ETC.

ASD KEY

- AMG FORCE BLOWER
- FAN TECH HP 220 BLOWER
- SUCTION POINT, 3" PVC RISER
- SUCTION POINT, 4" PVC RISER
- 3" PVC OVER HEAD PIPE
- 4" PVC OVER HEAD PIPE
- AREAS TO BE SEALED

WALL KEY

- NEW
- EXISTING
- EXISTING TO BE REMOVED

ALTERATION & ADDITION TO AN EXISTING BUILDING 89 MORRIS STREET (TOWN LANE) MORRISTOWN, NJ. 07960 COUNTY OF MORRIS BLOCK 4801 | LOT 11	FRANK A. VOLENTE ARCHITECT / PLANNER N.J.A.I. 06944 / N.J.L.I. 02566 166 HILLCREST DRIVE DENVILLE, N.J. 07834 973 586 5207 PH/FAX	DATE: 3 JUNE 02 SCALE: 1/8"=1'-0" JOB NO: 0210

DWG A-2 OF 2

FRANK A. VOLENTE